

**AMENDMENTS TO THE SPECIFICATION**

**Amend the specification by inserting before the first line the sentence:**

This is a continuation of Application No. 10/176,004, filed June 21, 2002; which in turn is a divisional of Application No. 09/790,655 filed February 23, 2001, now U.S. Patent No. 6,437,493, which is a divisional of Serial No. 09/514,200, filed February 25, 2000, now U.S. Patent No. 6,236,148) the disclosure of which is incorporated herein by reference.

Page 2, first full paragraph, delete in its entirety, and insert the following new paragraph:

The chromate film to be formed on the main metal shell of the glow plug and the spark plug has been a so-called yellow chromate film. Since the yellow chromate film exhibits excellent anti-corrosion performance, the yellow chromate film is widely employed in a variety of fields including coating of the inner surface of a can as well as the glow plug and the spark plug. Since a portion of contained chrome components is ~~sixivalent~~ hexavalent chrome, use of the yellow chromate film has gradually been inhibited in recent years owing to global focusing on the environmental protection. For example, discontinuance of the chromate film containing ~~sixivalent~~ hexavalent chrome in the future has been considered in, for example, the automobile industrial field in which glow plugs and spark plugs are used in a large quantity. Since a processing bath for forming the yellow chromate film contains ~~sixivalent~~ hexavalent chrome at a relatively high concentration, there arises a problem in that an excessively large cost is required to dispose waste water.

Page 3, first full paragraph, delete in its entirety, and insert the following new paragraph:

Therefore, chromate films of a type which does not contain ~~sixivalent~~ hexavalent chrome, that is, films of a type that the substantially overall portion of chrome components is contained as trivalent chrome have been researched and developed at a relatively earlier time. Thus, processing baths containing ~~sixivalent~~ hexavalent chrome at a relatively low concentration or baths containing no ~~sixivalent~~ hexavalent chrome have been developed. Therefore, the problem of disposal of waste waster has been overcome. However, the chromate film employing the trivalent chrome suffers from unsatisfactory anti-corrosion performance as compared with the yellow chromate film. Therefore, wide use of the yellow chromate film as a film with which the main metal shell of the glow plug and the spark plug is coated has not been realized.

Page 4, first full paragraph after "Summary of the Invention", delete in its entirety, and insert the following new paragraph:

It is an object of the present invention is to provide a glow plug and a spark plug having a chromate film which covers the surface of its main metal shell and which contains ~~sixivalent~~ hexavalent chrome in a small quantity and exhibiting excellent anti-corrosion performance and heat resistance as compared with those of a conventional chromate film and a manufacturing method therefor.

Page 5 first full paragraph, delete in its entirety, and insert the following new paragraph:

The foregoing structure are arranged such that the surface of the main metal shell is coated with a chromate film containing trivalent chrome by 95 wt% or more of contained chrome components and having a thickness of 0.2  $\mu\text{m}$  to 0.5  $\mu\text{m}$ . That is, a usual yellow chromate film contains ~~sixivalent~~ hexavalent chrome by about 25 wt% to 35 wt% of the chromate components. On the other hand, the film according to the present invention contains ~~sixivalent~~ hexavalent chrome in a small quantity of 5 wt% or less of the chrome components. Therefore, an effect required of the environmental protection can be improved. The employed chromate processing solution does not contain any ~~sixivalent~~ hexavalent chrome or contains the same in a small quantity as compared with a processing solution for forming the yellow chromate film. Hence it follows that a problem of disposal of waste water does not easily occur.

Page 7            second paragraph, delete in its entirety, and insert the following new paragraph:

When the thickness of the chromate film is smaller than 0.2  $\mu\text{m}$ , satisfactory anti-corrosion performance and heat resistance cannot be realized. When the thickness is larger than 0.5  $\mu\text{m}$ , a crack of the film occurs and/or separation of the film easily takes place. Thus, the anti-corrosion performance undesirably deteriorates. It is preferable that the thickness of the chromate film is 0.3  $\mu\text{m}$  to 0.5  $\mu\text{m}$ . It is preferable that the chromate film does not substantially contain ~~sixivalent~~ hexavalent chrome.

Page 11, second full paragraph, delete in its entirety.

An effective complexing agent is any one of a variety of chelating agents (dicarboxylic acid, tricarboxylic acid, oxyacid (hydroxyl-group dicarboxylic acid or hydroxyl-group tricarboxylic acid: for example, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, cork acid, selenious acid, sebacic acid, meleic acid, phthalic acid, terephthalic acid, tartaric acid, citric acid, malic acid or ascorbic acid). Another complexing agent may be employed. Complexing agents which can be employed are as disclosed in the foregoing laid-open German Patent.

Page 25 last paragraph to top of page 26, delete in its entirety, and insert the following new paragraph:

The chromate processing bath ~~50-150~~ shown in Fig. 2B was prepared by dissolving 50 g of chrome chloride (III) ( $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ ), 3 g of cobalt nitrate (II) ( $(\text{NO}_3)_2$ ), 100 g of sodium nitrate ( $\text{NaNO}_3$ ) and 31.2 g of malonic acid with respect to one liter of deionized water. Then, the temperature of the solution was maintained at  $60^\circ\text{C}$  by operating a heater. Moreover, the pH of the bath was adjusted to 2.0 by adding caustic soda solution. The main metal shell having the zinc-plated layer was immersed in the chromate processing solution 50 for 60 seconds. Then, the main metal shell was cleaned with water and dried. Then, drying with hot air, the temperature of which was  $80^\circ\text{C}$ , was performed so that a chromate film was formed (sample (1): example).

Page 27        first full paragraph, delete in its entirety, and insert the following new paragraph:

A state of presence of chrome in each of the formed chromate films was examined by an X-ray photospectral analysis (XPS) method. Fig. 3 shows peaks of chrome (2 p<sub>2/3</sub>) in the photospectrum of samples (1) and (2). Sample (1) (indicated with a solid line) was free of a peak at the position corresponding to ~~sixivalent~~ hexavalent chrome. Thus, a major portion of the chrome components was trivalent chrome. On the other hand, sample (2) had the peak of trivalent chrome on which the peak of ~~sixivalent~~ hexavalent chrome was superimposed. Thus, a raised portion was detected in the high energy portion of the peak.

Page 28,        first full paragraph, delete in its entirety, and insert the following new paragraph:

According to the results, assuming that the height of the peak of trivalent chrome was I<sub>1</sub> and that of ~~sixivalent~~ hexavalent chrome was I<sub>2</sub>, I<sub>2</sub>/(I<sub>1</sub> + I<sub>2</sub>) was about 0.2 (it is preferable that I<sub>2</sub>/(I<sub>1</sub> + I<sub>2</sub>) is 0.05 or smaller to reduce the quantity of ~~sixivalent~~ hexavalent chrome). A dichromatic sesquioxide standard reference material was used to make an analytical curve to calculate the weight-content of ~~sixivalent~~ hexavalent chrome in the overall quantity of the chrome components. A fact was detected that about 15 wt% was ~~sixivalent~~ hexavalent chrome and the residue was trivalent chrome. Also samples (1) and (3) were similarly analyzed, resulting in that substantially the overall portion of the chrome components was trivalent chrome.

Page 34, first full paragraph, delete in its entirety, and insert the following new paragraph:

A state of presence of chrome in each of the formed chromate films was examined by an X-ray photospectral analysis (XPS) method. Fig. 12 shows peaks of chrome (2 p<sub>2/3</sub>) in the photospectrum of samples (1) and (2). Sample (1) (indicated with a solid line) was free of a peak at the position corresponding to ~~sixivalent~~ hexavalent chrome. Thus, a major portion of the chrome components was trivalent chrome. On the other hand, sample (2) had the peak of trivalent chrome on which the peak of ~~sixivalent~~ hexavalent chrome was superimposed. Thus, a raised portion was detected in the high energy portion of the peak.

Page 34, last full paragraph to top of page 35, delete in its entirety, and insert the following new paragraph:

According to the results, assuming that the height of the peak of trivalent chrome was I<sub>1</sub> and that of ~~sixivalent~~ hexavalent chrome was I<sub>2</sub>, I<sub>2</sub>/(I<sub>1</sub> - I<sub>2</sub>) was about 0.2 (it is preferable that I<sub>2</sub>/(I<sub>1</sub> - I<sub>2</sub>) is 0.05 or smaller to reduce the quantity of ~~sixivalent~~ hexavalent chrome). A dichromatic sesquioxide standard reference material was used to make an analytical curve to calculate the weight-content of ~~sixivalent~~ hexavalent chrome in the overall quantity of the chrome components. A fact was detected that about 15 wt% was ~~sixivalent~~ hexavalent chrome and the residue was trivalent chrome. Also samples (1) and (3) were similarly analyzed, resulting in that substantially the overall portion of the chrome components was trivalent chrome.